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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/795,904	03/08/2004	Richard L. McCreery	OSU1159-198A	1545

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EXAMINER	
ZACHARIA, RAMSEY E	
ART UNIT	PAPER NUMBER
1773	

DATE MAILED: 05/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/795,904	MCCREERY, RICHARD L.	
	Examiner	Art Unit	
	Ramsey Zacharia	1773	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 March 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14,17-30 and 33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14,17-30 and 33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 112

2. Claims 1-14 and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. The phrase "said layer" on line 13 of claim 1 renders claims 1-14 and 17 indefinite because it is unclear if "said layer" refers to the layer of molecular units or the layer having conductance of the second conductive component.

Claim Language

4. For the purpose of examination, "said layer" on line 13 of claim 1 is taken to refer to the layer of molecular units.

Claim Rejections - 35 USC § 102

5. Claims 1-6, 9-14, and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Zhou et al. (Appl. Phys. Lett. 71 (5), 1997).

Zhou et al. teach a molecular wire comprising monolayer of parallel, biphenyl units covalently bonded to the surface of a gold electrode (Figure 1). A layer of titanium and gold is

formed over the monolayer to form a top electrode. Because the top electrode is exposed, at least some of the outer surface will inherently oxidize resulting in a top electrode that comprises both a metal and a metal oxide wherein the metal oxide is gold oxide and/or titanium oxide. When either a positive or negative a voltage differential is applied across the electrodes, electrons flow to the monolayer from one of the electrodes (see page 612, column 2 and page 613, column 1). A reaction involving the transfer of electrons is a redox reaction.

6. Claims 1-7, 9-14, 17-26, 29, 30, and 33 are rejected under 35 U.S.C. 102(e) as being anticipated by Gryko et al. (U.S. Patent 6,324,091).

Gryko et al. teach an apparatus for storing data comprising a storage medium having first and second subunits coupled to a working electrode (corresponding to substrate of first conductive component) and a reference electrode (corresponding to the second conductive component) (Figure 1 and column 3, lines 53-60). The apparatus operates by oxidizing the storage medium (column 3, lines 20-28). The storage device optionally includes an electrolyte, i.e. an electrolyte is not required (column 23, lines 64-65), and, when present, the suitable electrolyte is a polymer layer, i.e. not an electrolytic solution (column 27, lines 34-44). Suitable subunits include various compounds having substituted and unsubstituted phenyl groups, such as porphyrinic macrocycles, metallocene, etc. (column 3, line 60-column 4, line 6). The storage molecule is electrically coupled to the electrode by either a direct covalent link (i.e. R---X chemical bond) or direct or indirect ionic bonding (which is taken to read on "strong electronic coupling") (column 7, lines 46-65). The molecules self-assemble on the electrode substrate (e.g. a metal such as gold) to form an organized monolayer that may be arranged in an upright

orientation (column 23, lines 40-57). This orientation indicates that the molecules of the self-assembled layer will be substantially parallel to each other. The electrodes may be formed of a metal such as gold, silver, or copper (column 52-58). Because the electrodes are exposed, at least some of the outer surface will inherently oxidize resulting in electrodes that comprises both a metal and a metal oxide wherein the metal oxide is gold, silver, or copper oxide.

An alternative embodiment comprises a mirror image construct as shown in Figure 4. In this embodiment, one working electrode and storage medium reads on the first conductive component and the other working electrode and storage medium reads on the second conductive component.

Claim Rejections - 35 USC § 103

7. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou et al. (Appl. Phys. Lett. **71** (5), 1997).

Zhou et al. teach all the limitations of claim 7, as outlined above, except for chemically bonding a carbon or oxygen atom of the molecular unit to a metal, silicon, or carbon unit of the substrate. Zhou et al. teach a chemical linkage of metal-S formed by the use of thiol functionalized biphenyl.

However, it would be obvious to one skilled in the art to use the analogous alcohol functionalized biphenyl (which would result in a metal-O chemical bond) since thiols and alcohols have similar structures and are known to behave in an analogous manner. See MPEP 2144.09.

Zhou et al. teach all the limitations of claim 8, as outlined above, except for the use of electrically conductive carbon as the bottom electrode. Zhou et al. teach gold as the electrode material.

However, it would be within the ability of one skilled in the art to select any known electrically conductive material, including electrically conductive carbon, for the bottom electrode since the function of the bottom electrode is to conduct electricity. The selection of a material based on its suitability for its intended use supports a *prima facie* obviousness determination. See MPEP 2144.07.

8. Claims 8, 27, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gryko et al. (U.S. Patent 6,324,091).

Gryko et al. teach all the limitations of claims 8, 27, and 28, as outlined above, except for the use of electrically conductive carbon as the working electrodes. Gold is the preferred electrode material, however Gryko et al. recognizes that numerous other materials are suitable for use as the electrode including other metals, metal alloys, organic conductors, nanostructures, crystals, etc. (column 26, lines 52-58).

Therefore, it would be within the ability of one skilled in the art to select any known electrically conductive material, including electrically conductive carbon, for the working electrode since the function of the working electrode is to conduct electricity. The selection of a material based on its suitability for its intended use supports a *prima facie* obviousness determination particularly in view of Gryko et al. recognition that the electrodes may be constructed from other suitable materials. See MPEP 2144.07.

Response to Arguments

9. Applicant's arguments filed 30 March 2006 have been fully considered but they are not persuasive.

Zhou et al. do not use an electrolytic solution in their molecular wire and the application of a voltage potential results in the transfer of electrons from an electrode to the monolayer, which is a redox reaction.

The device of Gryko et al. also operates through a redox reaction. Furthermore, while Gryko et al. do disclose an electrolyte layer, the electrolyte layer is explicitly referred to as an optional layer (indicating that the electrolyte layer is not required) and is described as a Nafion polymer film (i.e. an electrolytic solid and not an electrolytic solution).

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

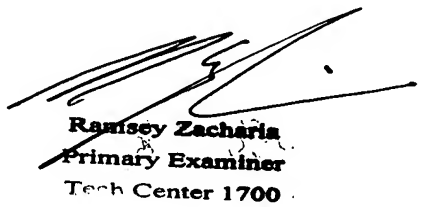
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ramsey Zacharia whose telephone number is (571) 272-1518. The examiner can normally be reached on Monday through Friday from 9 to 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carol Chaney, can be reached at (571) 272-1284. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Ramsey Zacharia
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